

What is claimed is:

1 1. A method for use in a wireless network, comprising:
2 identifying a plurality of orthogonal sets of user devices, wherein each
3 orthogonal set in said plurality of orthogonal sets includes multiple user devices that
4 can be transmitted to concurrently by an access point using different antenna beams;
5 selecting an orthogonal set from the plurality of orthogonal sets based on a
6 predetermined selection criterion; and
7 initiating a spatial division multiple access (SDMA) exchange for the selected
8 orthogonal set.

1 2. The method of claim 1, wherein:
2 selecting an orthogonal set includes selecting a set based on an amount of data
3 that is buffered for delivery to user devices within each of said identified orthogonal
4 sets.

1 3. The method of claim 1, wherein:
2 selecting an orthogonal set includes:
3 determining a maximum duration for the SDMA exchange;
4 evaluating orthogonal sets in said plurality of orthogonal sets to
5 determine an amount of data that is buffered for said orthogonal sets; and
6 selecting an orthogonal set that has a largest amount of buffered data
7 that can be delivered within said maximum duration of said SDMA exchange.

1 4. The method of claim 1, wherein:
2 selecting an orthogonal set includes using quality of service (QOS) information
3 as part of said predetermined selection criterion.

1 5. The method of claim 1, wherein:
2 selecting an orthogonal set includes using latency related information as part of
3 said predetermined selection criterion.

1 6. The method of claim 1, wherein:
2 initiating an SDMA exchange includes simultaneously transmitting data to user
3 devices in said selected orthogonal set, using corresponding antenna beams, so that a
4 terminal end of the data transmitted to each user device occurs at substantially the same
5 time.

1 7. The method of claim 6, further comprising:
2 receiving acknowledgement (ACK) signals from said user devices in said
3 selected orthogonal set after said data has been transmitted, wherein said ACK signals
4 are received from said user devices at approximately the same time.

1 8. The method of claim 1, wherein initiating an SDMA exchange includes:
2 simultaneously transmitting data to user devices in said selected orthogonal set
3 using corresponding antenna beams; and
4 transmitting an acknowledgement (ACK) request to each user device in said
5 selected orthogonal set after said data has been transmitted.

1 9. The method of claim 8, wherein:
2 transmitting an ACK request includes transmitting a separate ACK request to
3 each user device in said selected orthogonal set using a corresponding antenna beam.

1 10. The method of claim 9, wherein:
2 said separate ACK requests are transmitted to corresponding user devices at
3 substantially the same time.

1 11. The method of claim 10, wherein:
2 said separate ACK requests each include time information indicative of a time at
3 which a corresponding user device is to respond to said ACK request.

1 12. The method of claim 9, wherein:
2 said separate ACK requests are transmitted to corresponding user devices at
3 different times, wherein said different times are selected based upon a predicted
4 resolvability of signals received from said user devices within said selected orthogonal
5 set.

1 13. The method of claim 8, wherein:
2 transmitting an ACK request includes transmitting a single multi-user ACK
3 request using an antenna beam that encompasses all of said user devices in said selected
4 orthogonal set.

1 14. The method of claim 13, wherein:
2 said single multi-user ACK request includes time information indicative of a
3 time at which each user device in said selected orthogonal set is to respond to said
4 single multi-user ACK request.

1 15. The method of claim 14, wherein:
2 said time information is determined based upon a predicted resolvability of
3 signals received from said user devices within said selected orthogonal set.

1 16. The method of claim 1, wherein:
2 initiating an SDMA exchange includes transmitting data to user devices in said
3 selected orthogonal set using corresponding antenna beams, wherein said data
4 transmitted to each of said user devices includes time information indicating a time at
5 which the corresponding user device is to acknowledge the data.

1 17. The method of claim 1, wherein:
2 initiating an SDMA exchange includes transmitting a training request packet to
3 a first user device within the selected orthogonal set.

1 18. The method of claim 17, wherein:
2 said training request packet is transmitted using an antenna beam that
3 encompasses substantially an entire coverage region of the access point.

1 19. The method of claim 1, wherein:
2 initiating an SDMA exchange includes transmitting a multi-user training request
3 packet to all of the user devices within said selected orthogonal set, wherein said multi-
4 user training request packet is transmitted using an antenna beam that encompasses
5 substantially an entire coverage region of the access point.

1 20. An access point (AP) for use in a wireless network implementing spatial
2 division multiple access (SDMA), comprising:
3 a multi-user wireless transceiver that is capable of simultaneously servicing
4 multiple users within a coverage area of the AP; and
5 a controller, coupled to said multi-user wireless transceiver, to identify a number
6 of orthogonal sets of user devices within the coverage area, to select one of the
7 identified orthogonal sets, and to initiate an SDMA exchange for the selected
8 orthogonal set, wherein an orthogonal set is a set that includes multiple user devices
9 that can be transmitted to concurrently by the access point using different antenna
10 beams.

1 21. The AP of claim 20, further comprising:
2 an antenna controller, coupled to the multi-user wireless transceiver, to manage
3 the generation of antenna beams for the AP.

1 22. The AP of claim 20, wherein:
2 said controller selects one of the identified orthogonal sets based on an amount
3 of data that is buffered for delivery to user devices in each of the identified orthogonal
4 sets.

1 23. The AP of claim 20, wherein:
2 said controller selects one of the identified orthogonal sets based, at least in part,
3 on a maximum duration of a subsequent SDMA exchange.

1 24. The AP of claim 20, wherein:
2 said controller initiates said SDMA exchange by causing said multi-user
3 wireless transceiver to transmit data to each of the user devices in said selected
4 orthogonal set using a separate antenna beam for each user device.

1 25. The AP of claim 24, wherein:
2 said controller causes said data to be transmitted by said multi-user wireless
3 transceiver so that a terminal end of the data transmitted to each of the user devices in
4 said selected orthogonal set occurs at substantially the same time.

1 26. The AP of claim 24, wherein:
2 said controller causes said multi-user wireless transceiver to transmit an
3 acknowledgement request to each of the user devices in said selected orthogonal set,
4 using a separate antenna beam for each user device, after said data has been transmitted.

1 27. The AP of claim 26, wherein:
2 said controller causes said multi-user wireless transceiver to transmit an
3 acknowledgement request to each of the user devices in said selected orthogonal set at
4 substantially the same time.

1 28. The AP of claim 26, wherein:
2 said controller causes said multi-user wireless transceiver to transmit an
3 acknowledgement request to each of the user devices in said selected orthogonal set at
4 different times, wherein said different times are based upon a predicted resolvability of
5 the resulting acknowledgement signals.

1 29. The AP of claim 24, wherein:
2 said controller causes said multi-user wireless transceiver to transmit a single
3 acknowledgement request to the user devices in said selected orthogonal set, using an
4 antenna beam that encompasses all of the user devices in said selected orthogonal set,
5 after said data has been transmitted.

1 30. The AP of claim 29, wherein:
2 said single acknowledgement request includes timing information indicating a
3 time at which an acknowledgement signal is to be transmitted by each of the user
4 devices within said selected orthogonal set.

1 31. The AP of claim 24, wherein:
2 said data transmitted to each of the user devices in said selected orthogonal set
3 includes timing information indicating a time at which an acknowledgement signal is to
4 be transmitted by each of the user devices in said selected orthogonal set.

1 32. An article comprising a storage medium having instructions stored thereon that,
2 when executed by a computing platform, result in:
3 identifying a plurality of orthogonal sets of user devices, wherein each
4 orthogonal set in said plurality of orthogonal sets includes multiple user devices that
5 can be transmitted to concurrently by an access point using different antenna beams;
6 selecting an orthogonal set from the plurality of orthogonal sets based on a
7 predetermined selection criterion; and
8 initiating a spatial division multiple access (SDMA) exchange for the selected
9 orthogonal set.

1 33. The article of claim 32, wherein:
2 selecting an orthogonal set includes selecting a set based on an amount of data
3 that is buffered for delivery to user devices within each of said identified orthogonal
4 sets.

1 34. The article of claim 32, wherein:
2 initiating an SDMA exchange includes simultaneously transmitting data to user
3 devices in said selected orthogonal set, using corresponding antenna beams, so that a
4 terminal end of the data transmitted to each user device occurs at substantially the same
5 time.

1 35. The article of claim 32, wherein initiating an SDMA exchange includes:
2 simultaneously transmitting data to user devices in said selected orthogonal set
3 using corresponding antenna beams; and
4 transmitting an acknowledgement (ACK) request to each user device in said
5 selected orthogonal set after said data has been transmitted.

1 36. The article of claim 35, wherein:
2 transmitting an ACK request includes transmitting a separate ACK request to
3 each user device in said selected orthogonal set using a corresponding antenna beam.

1 37. The article of claim 35, wherein:
2 transmitting an ACK request includes transmitting a single multi-user ACK
3 request using an antenna beam that encompasses all of said user devices in said selected
4 orthogonal set.

1 38. The article of claim 32, wherein:
2 initiating an SDMA exchange includes transmitting data to user devices in said
3 selected orthogonal set using corresponding antenna beams, wherein said data

4 transmitted to each of said user devices includes time information indicating a time at
5 which the corresponding user device is to acknowledge the data.

1 39. A system comprising:

2 a plurality of antenna elements that includes at least one dipole antenna element;

3 a multi-user wireless transceiver, in communication with said plurality of
4 antenna elements, that is capable of simultaneously servicing multiple users within a
5 network coverage area; and

6 a controller, coupled to said multi-user wireless transceiver, to identify a number
7 of orthogonal sets of user devices within the network coverage area, to select one of the
8 identified orthogonal sets, and to initiate an SDMA exchange for the selected
9 orthogonal set, wherein an orthogonal set is a set that includes multiple user devices
10 that can be transmitted to concurrently using different antenna beams.

1 40. The system of claim 39, further comprising:

2 an antenna controller, coupled to the multi-user wireless transceiver, to manage
3 the generation of antenna beams using the plurality of antenna elements.

1 41. The system of claim 39, wherein:

2 said controller initiates said SDMA exchange by causing said multi-user
3 wireless transceiver to transmit data to each of the user devices in said selected
4 orthogonal set using a separate antenna beam for each user device.

1 42. The system of claim 41, wherein:

2 said controller causes said data to be transmitted by said multi-user wireless
3 transceiver so that a terminal end of the data transmitted to each of the user devices in
4 said selected orthogonal set occurs at substantially the same time.

1 43. The system of claim 41, wherein:
2 said controller causes said multi-user wireless transceiver to transmit an
3 acknowledgement request to each of the user devices in said selected orthogonal set,
4 using a separate antenna beam for each user device, after said data has been transmitted.

1 44. A method for use in a wireless network, comprising:
2 determining an amount of data to be transmitted to each user device in a group
3 of user devices;
4 determining when data transmission needs to be started for each user device in
5 said group of user devices so that data transmission to all of the user devices in said
6 group of user devices terminates at substantially the same time; and
7 transmitting data to the user devices in said group of user devices at the
8 appropriate times so that data transmission to all of the multiple user devices terminates
9 at substantially the same time, wherein data is transmitted to each of the user devices in
10 said group of user devices using a different antenna beam.

1 45. The method of claim 44, further comprising:
2 receiving acknowledgement signals from said user devices in said group of user
3 devices in response to said transmitted data, wherein said acknowledgement signals are
4 all received at approximately the same time.

1 46. The method of claim 45, wherein:
2 said acknowledgement signals are each received in a different receive beam.